5. IMPACT ASSESSMENT APPROACH

5.1 AIR QUALITY MODELING

An air quality modeling analysis has been performed to assess impacts associated with the expansion of the SSAJV facility. The pollutants evaluated include criteria pollutants PM_{10}, CO, NO_X, SO_2, and a number of hazardous air pollutants (HAPs). Emissions were modeled to determine compliance with the National Ambient Air Quality Standards (NAAQS) and Prevention of Significant Deterioration (PSD) Increments, and to assess impacts with respect to HAPs criteria. In addition, emissions were modeled to determine effects on air quality related values (AQRVs) at surrounding Class I Areas and parks.

All of the analyses are based on the Environmental Protection Agency (EPA) Industrial Source Complex Model - Version 3 (ISC3). ISC3 is selected for its ability to model multiple sources in simple and complex terrain. It is recommended for use in this situation in the "Guideline on Air Quality Models" (USEPA, 1995a).

The ISC3 model is a steady-state, multiple-source, Gaussian dispersion model designed for use with stack emission sources situated in simple and complex terrain. ISC3 also incorporates complex phenomena such as building-induced plume downwash and the gravitational settling and deposition of particulate matter.

Technical options selected for the ISC3 modeling are listed below. Use of these options follow EPA's modeling guidance and/or sound scientific practice. An explanation of these options and the rationale for their selection is provided below. The required input options for ISC3 are as follows:

- Final plume rise
- Buoyancy induced dispersion
- Stack tip downwash
- Rural Dispersion Coefficients
- Calm processing
- Default wind profile exponents
- Default vertical temperature gradients
- Anemometer height = 10.0 meters

Final plume rise is recommended by EPA when there is no significant terrain close to the stacks. Buoyancy-induced dispersion, which accounts for the buoyant growth of a plume caused by entrainment of ambient air, was included in the modeling because of the relatively warm exit temperature and subsequent buoyant nature of the exhaust plumes for both projects. Stack-tip downwash, which adjusts the effective stack height downward following the methods of Briggs (1969) for cases where the stack exit velocity is less than 1.5 times the wind speed at stack top, is selected as per EPA guidance.

Based on the land use classification procedure of Auer (1978), land use in the region surrounding the project site is greater than 50 percent rural. Therefore, rural dispersion coefficients were used in the dispersion analyses.

The calm processing option allows the user to direct the program to exclude hours with persistent calm winds in the calculation of concentrations for each averaging period. This option is generally recommended by the EPA for regulatory applications. The ISC3 model recognizes a calm wind condition as a wind speed of 1 meter per second and a wind direction equal to that of the previous hour. The meteorological preprocessor program (RAMMET) automatically makes this assignment to calm hours. The calm processing option in ISC3 then excludes these hours from the calculation of concentrations.

ISC3 includes building downwash algorithms, where appropriate, in its calculations. This accounts for plumes being affected by downwash regions in the vicinity of buildings and results in plume height reductions and greater initial dispersion. The BEE-Line version of GEP-BPIP was used to determine the building downwash parameters for the over 60 sources in the model runs.

5.1.1 Criteria Pollutant Analysis

Criteria pollutants from all permitted sources were modeled using ISC3. Impacts are compared with the significant impact levels (SILs), NAAQS, Wyoming Ambient Air Quality Standards (WAAQS), Class II PSD Increments, and the de minimis Monitoring Levels. These criteria are summarized in Table 5-1.

Table 5-1: Air Quality Modeling Criteria

Pollutant	Averaging Period	Criteria Concentrations ($\mu g/m^3$)			
		Significant Impact Level	NAAQS/ WAAQS	Class II PSD Increment	De minimis Monitoring Level
PM_{10}	24-hour	5	150	30	10
	Annual	1	50	17	--
CO	1-hour	2,000	40,000	--	--
	8-hour	500	10,000	--	575
NO_X	Annual	1	100	25	14
SO_2	3-hour	25	1300	512	-
	24-hour	5	365	91	13
	Annual	1	80	20	-

There is no modeling requirement in NSR/PSD permitting to demonstrate compliance with the ozone NAAQS. Ozone is an indirect pollutant (i.e., no source emits ozone, but ozone is formed in the atmosphere by a series of very complex photochemical reactions. VOC and NO_X are considered primary precursors to the formation of ozone. Traditionally, VOC has been the primary focus of control strategies intended to reduce ozone, but it is widely recognized that some forms of VOC are much more reactive than others, and NO_X and NH_3 concentrations play an important part in the formation of ozone.

The PSD regulations established significant impact levels (SILs) for all criteria pollutants except for ozone. If impacts from the project are demonstrated to be below the SIL, no further analysis is required. For ozone, no ambient level was established in recognition of the fact that no reasonable technique is available to estimate the impact from a point source. In lieu of an ambient impact, the PSD regulations established an increase in VOC emission greater than 100 tons per year as the de minimis limit.

In the EPA published Guidance Notebook for New Source Review, only one reference was found to deal with reactive pollutants. In this guidance, EPA referred to "Guidelines for Implementation of a Regional New Source Review Program for Stationary Sources." This resource indicates that

> "Reactive pollutants (HC-O_X and NO_X) are somewhat difficult to deal with at the present time. Existing modeling techniques do not appear to adequately predict the reactive pollutant impact of specific point sources. Since no acceptable modeling is presently possible, the air quality portion of the NSR need not apply if there is no SIP control strategy demonstration for the area."

Currently, modeling for ozone has been related to non-attainment areas, and has involved the use of large scale regional models like the Urban Airshed Model (UAM). The Reactive Plume Model (RPM) may have been used in a few cases, but it is believed to be very conservative and no consensus has been reached concerning the use of RPM for permitting.

The closest monitor for ozone is north of Pinedale, Wyoming. Typically, the chemical reaction to convert emissions to ozone requires approximately 20 to 45 minutes. This monitor is at a distance that would allow a transport time typically greater than 20 minutes and would therefore allow the reaction to take place. This monitor has recorded a maximum ozone concentration of 110 $\mu g/m^3$. Many factors contribute to this ozone concentration. It is very conservative to assume that this ambient level is formed entirely by emissions from soda ash production.

The U.S. Bureau of Mines publishes yearly production rates from the five local soda ash producers. In 1996, approximately 10 MM tons of soda ash were produced from approximately 20 MM tons of trona ore. SSAJV's proposed expansion will produce an additional 1.2 MM TPY of soda ash from approximately 2 MM tons of trona ore. The increase in VOC emissions associated with this project are approximately ten percent of the existing baseline. Under that conservative assumption, an equivalent change could occur in the ambient ozone concentration. Based on this approach, this project will not result in an exceedance of the Wyoming Standard of 160 $\mu g/m^3$. This will also not result in an exceedance of the Federal Standard of 235 $\mu g/m^3$.

5.1.1.1 AAQS Analysis

The EPA has defined a set of significant impact levels (SILs) which are used to determine whether a detailed air quality impact analysis needs to be performed to assess attainment of the Ambient Air Quality Standards (AAQS). By modeling projected air quality impacts, if impacts from the proposed modifications exceeds the SILs for any of the criteria pollutants, then an AAQS compliance demonstration must be performed.

To demonstrate compliance with the AAQS, impacts from the proposed projects must be modeled and added to regional background levels. This total concentration is then compared to the AAQS to assess attainment.

Compliance with AAQS requires the inclusion of background emissions. Monitored data has been obtained to represent the background. Upwind PM_{10} monitor data collected at the SSAJV facility is presented in Table 5-2.

Table 5-2: PM_{10} Background Monitored Data

($\mu g/m^3$)

Year	24-hour		Annual
	High	Second-High	
1994	41	34	11.25
1995	57	24	9.72
1996	27	26	10.02
3-year Maximum	**57**	**34**	**11.25**

A background value for NO_X of 3.0 $\mu g/m^3$ was taken from 1993 measurements at the Chevron Phosphate Plant, south of Rock Springs. (This value has been used in previous air quality permit applications.)

5.1.1.2 PSD Compliance Analysis

For sources located in an attainment area, PSD review includes a Best Available Control Technology (BACT) analysis, NAAQS compliance demonstration, air quality increment analysis, assessment of Class I and Class II impacts, and an assessment of air quality related values.

If a source emits, or has the potential to emit, over 100 tons per year (TPY) of any pollutant subject to regulation under the CAA and is one of the specific source categories listed in the federal PSD regulations, the source is considered a major source [40 CFR 52.21 (b)(23)(i)]. All the sources that do not fall under the specific source category listing are evaluated against a 250 TPY major source threshold to determine PSD applicability. The SSAJV facility is a major source as defined under the PSD regulations.

For each pollutant subject to PSD review, the air quality analysis must determine AAQS compliance, as discussed above, and must evaluate the amount of PSD increment that is available to the new source, as well as the potential amount of increment that the new source is expected to consume. Only PM_{10} meets these requirements.

5.1.2 HAPs Analysis

HAP emissions from sources #17, 48, 80, and the mine exhaust were modeled. Results from this modeling are compared with the lowest and highest allowable ambient levels (AALs) from all existing state programs, as determined from a survey of EPA's NATICH bulletin board. A summary of the lowest and highest allowable ambient HAP levels (AALs) are shown in Tables 5-4 and 5-5, respectively.

A risk assessment was conducted on the HAPs which are suspected carcinogens. The unit risk factors associated with these compounds (from the IRIS data base) were multiplied to the modeled annual concentrations and multiplied by one million. The result is the risk of contracting cancer on the basis of one in a million. The calculated risk of the applicable HAPs is shown in Section 6, Table 6-6.

Table 5-3: NATICH Lowest Allowable Ambient HAP Levels

	Lowest AALs (µg/m3)			
	1-hour	8-hour	24-hour	Annual
ACETALDEHYDE	90	900	4.89	0.45
ACETOPHENONE	150	-	40	49
ACROLEIN	2.3	2.3	0.6	0.0004
ACRYLONITRILE	21	21.5	1.18	0.0147
BENZENE	30	30	1.74	0.1
BIPHENYL	2.3	13	0.34	0.01
BIS(2-ETHYLHEXYL)PHTHALATE	50	50	4	0.2
1,3 BUTADIENE	7.2	220	1.2	0.003
2-BUTANONE	3900	5900	32.1	32.1
CUMENE	500	2450	588	0.009
ETHYL BENZENE	2000	4340	118	118
FORMALDEHYDE	15	4.5	0.033	0.004
HEXANE	1760	1800	432	176
METHYLENE CHLORIDE	260	870	9.45	0.2
NAPHTHALENE	440	500	120	14
PHENOL	154	95	45.6	10
PROPIONALDEHYDE	21	4290	-	-
STYRENE	215	1070	116	1.75
TOLUENE	1880	1870	10.2	10.2
1,1,1-TRICHLOROETHANE	10800	4550	1040	1000
TRICHLOROETHENE	1100	1350	36.5	0.42
XYLENE	2079	2170	3500	434

Table 5-4: NATICH Highest Allowable Ambient HAP Levels

	Highest AALs (μg/m3)			
	1-hour	8-hour	24-hour	Annual
ACETALDEHYDE	2700	4290	18000	600
ACETOPHENONE	490	-	4910	100
ACROLEIN	*80	6.9	6	0.83
ACRYLONITRILE	43	107	43	15
BENZENE	630	714	320	100
BIPHENYL	2.3	36	126	5
BIS(2-ETHYLHEXYL)PHTHALATE	100	119	200	120
1,3 BUTADIENE	110	52400	528	11
2-BUTANONE	*89000	11800	59000	1970
CUMENE	500	5860	24600	245
ETHYL BENZENE	*54000	43500	7200	5430
FORMALDEHYDE	*150	71	12	7.69
HEXANE	5300	36000	29000	200
METHYLENE CHLORIDE	17400	8330	8750	8440
NAPHTHALENE	*7900	1190	50000	167
PHENOL	950	1900	456	456
PROPIONALDEHYDE	21	4290	-	-
STYRENE	*42500	5120	21300	716
TOLUENE	*56000	8930	37700	7500
1,1,1-TRICHLOROETHANE	*250000	190000	191000	38000
TRICHLOROETHENE	10700	6430	134000	6840
XYLENE	6510	4400	7200	434

* 15-minute average

5.2 METEOROLOGICAL DATA

EPA modeling guidelines require that either one year of on-site meteorological data or five years of representative off-site meteorological data be used in an air quality analysis (USEPA, 1995a).

Five years of meteorological data, obtained from the EPA BBS for the years 1987-1991 is used in this analysis. Surface data was obtained for Rock Springs and upper air data from Lander, Wyoming. This data was processed using the EPA's PCRAMMET program. This program is used to generate stability classes from the surface and upper air data and to interpolate the twice daily mixing heights for each hour.

5.3 SOURCE CHARACTERISTICS

5.3.1 Stack Parameters

Stack parameters and emission rates are based on permitted, or to be permitted, values. Stack parameters used in the modeling analysis are presented in Table 5-5. Emission rates are presented in Table 5-6.

Table 5-5: Stack Parameters

AQD #	Name	Location (UTM)		Stack Height		Diameter	Temp	Velocity
	Existing	East	North	feet	meters	meters	K	m/s
2a	Ore crusher	603661.2	4594979.9	23	7.01	1.06	293.2	15.85
2b	Ore reclaim	603749.6	4595001.2	38	11.58	0.33	293.2	27.74
6a	Top silos	603892.8	4594835.1	133	40.54	0.64	308.7	24.99
6b	Silo reclaim	603900.4	4594810.7	15.5	4.72	0.67	297.0	10.06
7	PLO	604045.2	4594861.0	82	24.99	0.75	293.2	19.51
10	Coal crushing	603865.4	4594992.1	13.3	4.05	0.60	293.2	5.49
11	Coal transfer	603873.0	4594819.9	35.3	10.76	0.55	293.2	6.40
14	Boiler coal bunker	603760.2	4594807.7	125	38.10	0.43	293.2	17.37
15	DR 1&2	603719.1	4594813.8	180	54.86	1.83	347.0	14.94
16	Product classifier	603722.1	4594824.5	126	38.40	1.07	369.3	12.80
17	CA 1&2	603685.5	4594807.7	180.5	55.02	3.66	463.7	13.41
18	BO-1	603834.9	4594807.7	180.5	55.02	2.21	324.8	17.68
19	BO-2	603834.9	4594780.3	180.5	55.02	2.21	322.0	18.29
24	Boiler fly ash silo	603819.7	4594786.4	25	7.62	0.30	301.5	12.50
25	AT crush and screen	603665.7	4595011.9	76	23.16	0.73	293.2	14.63
26	AT Dryer	603673.4	4594984.5	67	20.42	0.73	310.9	17.68
27	AT Bagging & Loadout	603697.7	4594975.3	60	18.29	0.48	293.2	18.90
28	Fluid Bed Dryer	603725.2	4594836.7	140	42.67	1.22	347.0	12.19
30	Lime Bin #1	603938.5	4594768.1	88	26.82	0.20	279.3	17.98
31	Lime Bin #2	603938.5	4594746.7	88	26.82	0.20	279.3	17.98
33	Sulfur Burner	603889.8	4594723.9	100	30.48	0.61	338.7	10.67
35	Sulfite Dryer	603929.4	4594725.4	103	31.39	0.70	327.0	14.63
36	Sulfite Bin #1	603929.4	4594702.5	60	18.29	0.15	338.2	25.88
37	Sulfite Bin #2	603943.1	4594702.5	60	18.29	0.15	338.2	25.88
P38	Sulfite Bin #3	603959.9	4594702.5	60	18.29	0.15	338.2	25.88
39	Sulfite Bin #4	603973.6	4594702.5	60	18.29	0.15	338.2	25.88
40	Sulfite Bagging	603953.8	4594733.0	60	18.29	0.30	338.2	15.54
41	Sulfite Loadout	603987.3	4594723.9	70	21.34	0.30	338.2	21.34
44	Lime Unloading	603870.0	4594748.3	30	9.14	0.46	279.3	18.59
45	AT Transloading	604030.0	4594847.3	17.8	5.43	0.27	293.2	8.84
46	Trona Transfer	603764.8	4594983.0	12.5	3.81	0.67	293.2	14.02
47	Exp Crusher	603649.0	4594992.1	125	38.10	1.37	293.2	13.72
48	CA-3	603685.5	4594845.8	180	54.86	3.20	449.8	9.75
50	Dryer Area	603713.0	4594847.3	180	54.86	1.37	366.5	8.23
51	DR-5	603738.9	4594838.2	180	54.86	2.44	422.0	10.06
52	Silo Top #2	603898.9	4594883.9	141	42.98	0.46	293.2	15.24
55	Ore recycle/reclaim	603600.2	4594984.5	64	19.51	0.40	293.2	15.24
62	Carbon Silo	603639.8	4594740.6	91	27.74	0.15	293.2	25.91
63	Perlite Silo	603652.0	4594737.6	58	17.68	0.15	293.2	31.09

AQD #	Name	Location (UTM)		Stack Height		Diameter	Temp	Velocity
		East	North	feet	meters	meters	K	m/s
64	Sulfite Blending #2	603973.6	4594690.4	15	4.57	0.15	293.2	29.26
65	Sulfite Blending #1	603959.9	4594690.4	35	10.67	0.23	293.2	4.57
66	Carbon/Perlite Scrubber	603705.4	4594771.1	125	38.10	0.30	293.2	22.86
67	Bottom Ash	603629.2	4594801.6	125	38.10	0.46	310.9	10.06
68	Bagging Trona Silo	603929.4	4594835.1	82	24.99	0.37	293.2	23.47
70	Bagging Sulfite Silo	603929.4	4594845.8	82	24.99	0.40	293.2	14.94
71	Bagging MBS Silo	603944.6	4594845.8	82	24.99	0.40	293.2	14.94
72	MBS Soda Ash Feed	603897.4	4594714.7	60.67	18.49	0.20	366.5	16.15
73	MBS Dryer	603885.2	4594714.7	95	28.96	0.61	305.4	17.07
	New expansion sources							
74	North Headframe	603507.2	4594999.7	105	32.00	0.41	288.7	18.19
75	Primary Crushing	603505.7	4595045.4	25	7.62	0.41	288.7	18.19
76	Primary Screening	603502.7	4594970.8	25	7.62	1.35	288.7	17.91
77	Transfer 101	603586.5	4594979.9	40	12.19	0.33	288.7	17.91
78	Transfer 102	603554.5	4594954.0	70	21.34	0.38	288.7	16.56
79	Transfer Point	603588.0	4594954.0	70	21.34	0.33	288.7	16.54
80	Calciner #4	603655.1	4594877.8	180	54.86	3.00	443.2	17.66
81	Product Dryer Area	603766.3	4594835.1	180	54.86	1.09	394.3	17.63
82	Dryer #6	603781.6	4594832.1	180	54.86	2.16	424.8	17.79
83	Silo Top	603953.8	4594882.4	130	39.62	0.43	366.5	17.08
84	Silo Bottom	603953.8	4594838.2	50	15.24	0.61	366.5	17.79
85	Industrial Boiler	603684.0	4594822.9	140	42.67	0.91	435.9	15.24
MV	Mine Exhaust Vent	603286.3	4594864.1	Volume Source				

Table 5-6: Emission Rates (Pounds per Hour)

AQD	Existing	PM_{10}	NO_X	SO_2	CO	VOC
2a	ore crusher	1.60				
2b	ore reclaim	0.0				
6a	top silos	0.30				
6b	silo reclaim	0.51				
7	PLO	1.20				
10	coal crushing	0.60				
11	Coal transfer	0.21				
14	boiler coal bunker	0.37				
15	DR 1&2	6.80	1.20			
16	product classifier	0.90				
17	CA 1&2	22.30	25		1524	776
18	BO-1	10.0	245	70	17.5	0.50
19	BO-2	10.0	245	70	17.5	0.50
24	boiler fly ash silo	0.30				
25	AT crush and screen	1.00				
26	AT Dryer	1.10	0.05		0.07	
27	AT Bagging & Loadout	0.50				
28	Fluid Bed Dryer	2.90				
30	Lime Bin #1	0.20				
31	Lime Bin #2	0.20				
33	Sulfur Burner		1.50	0.40		
35	Sulfite Dryer	1.40				
36	Sulfite Bin #1	0.10				
37	Sulfite Bin #2	0.10				
38	Sulfite Bin #3	0.10				
39	Sulfite Bin #4	0.10				
40	Sulfite Bagging	0.00				
41	Sulfite Loadout	0.19				
44	Lime Unloading	0.90				
45	AT Transloading	0.20				
46	Trona Transfer	0.71				
47	Exp Crusher	2.90				
48	CA-3	9.34	12.5		762	388
50	Dryer Area	1.39				
51	DR-5	4.80	18.0		2.40	
52	Silo Top #2	0.50				
53	Silo Bottom #2	0.90				
54	T-200 Silo	0.19				
55	Ore recycle/reclaim	0.40				

AQD #		PM_{10}	NO_X	SO_2	CO	VOC
62	Carbon Silo	0.13				
63	Perlite Silo	0.17				
64	Sulfite Blending #2	0.15				
65	Sulfite Blending #1	0.06				
66	Carbon/Perlite Scrubber	0.58				
67	Bottom Ash	0.47				
68	Bagging Trona Silo	0.36				
70	Bagging Sulfite Silo	0.27				
71	Bagging MBS Silo	0.27				
72	MBS Soda Ash Feed	0.11				
73	MBS Dryer	1.20	0.15	0.77		
MV	Mine Exhaust Vent				3.75	115.0
	Expansion sources					
74	North Headframe	0.34				
75	Primary Crushing	0.34				
76	Primary Screening	3.70				
77	Transfer BH 101	0.22				
78	Transfer BH 102	0.27				
79	Transfer Point	0.21				
80	Calciner #4 ESP	11.93	20.0	0.0	1047.75	533.5
81	Product Dryer Area BH	1.74				
82	Dryer #6 ESP	4.08	30.0	0.0	14.0	0.27
83	Silo Top	0.29				
84	Silo Bottom	0.59				
85	Industrial Boiler	0.48	3.80	0.06	9.0	0.28

Sources can be modeled as points, areas, or volumes depending on the type of source and emission point. Point sources are used to model stack releases and incorporate plume rise. Area sources represent fugitive releases from flat sources such as evaporation from a pond. Volume sources also represent releases from non-stack sources and incorporate the initial vertical extent of the release.

All stacks and vents were modeled as point sources. This includes all of the facility's sources except the mine ventilation shaft (MV). This source was modeled as a volume source to accurately represent initial lateral and vertical dimensions of the release from the source.

The mine exhaust is modeled as a volume source to account for the large initial horizontal mixing from the horizontally oriented vent. Exhaust from the existing vent can be felt at ground level at a distance of up 250 feet. The initial lateral extent of the mine exhaust source is based on this distance. The vertical extent of the mine exhaust vent source is 16 feet, based on the height of the top of the vent from the ground.

5.3.2 Good Engineering Practice Stack Height Analysis

Due to the proximity of structures and buildings to the stack sources, the potential for downwash effects were evaluated to assess close-in ambient air impacts. The formula for GEP height estimation is:

$$H_s = H_b + 1.50L_b$$

Where:

H_s - GEP stack height

H_b - Building height

L_b - The lesser building dimension of the height, length, or width

To determine whether or not a structure (building) potentially affects pollutant dispersion from a nearby emission source, EPA provides specific guidance. The guidance states that, if a structure is located within a certain distance from the emission source (stack), downwash effects on the dispersion of stack emissions must be considered. The distance criteria are the following:

- The emission source is within five times the lesser of the structure height or width when the source is downwind of the structure;
- The emission source is within two times the lesser of the structure height or width when the source is upwind of the structure; and
- The emission source is within one-half the lesser of the structure height or

width when the emission source is adjacent to a structure, regardless of the wind flow trajectory.

To determine which structures on-site could induce downwash, an initial screening was performed. Plot plans were reviewed to see if the buildings met any of the distance criteria outlined above. Based on the initial screening for the relationship of sources to the location of plant structures, the locations and dimensions of emission sources and plant structures were input to a software package developed by Bowman Engineering that evaluates building downwash. The GEP-Building Profile Input Program (GEP-BPIP) was used to calculate the direction-specific building dimensions for input into the ISC3 model. GEP-BPIP was designed to incorporate the concepts and procedures expressed in the GEP technical support document (USEPA, 1985).

For refined modeling analyses, EPA guidelines require that wind direction-specific building dimensions be input from results of the GEP-BPIP runs for each source affected by building downwash. This will account for the source orientation with respect to a particular building using the Schulman-Scire building downwash algorithm within ISC3. This allows the model to compare downwash from different structures depending on different wind directions. The structure width of the applicable structure is measured at each specified 10° interval (i.e., from 10° clockwise to 360°) by projecting a perpendicular line to an individual wind direction and noting the length of this line from one edge of the structure to the other. Thus, the projected structure width varies by wind direction, while the structure height remains the same. The ISC3 model internally checks whether the stack height of the emission source is less than the building heights plus one-half times the lesser of the building height or width. If this condition is not satisfied, then the model defaults to the Huber-Snyder building downwash algorithm and only one set of building dimensions is applied through all wind directions.

Building dimensions, and resulting GEP formula heights, are presented in Table 5-7.

Table 5-7: Preliminary GEP Analysis

Building Name	Height (feet)	Width (or Diameter) (feet)	Length (feet)	MPW (feet)	L (feet)	GEP Formula (feet)	3L (feet)	5L (feet)	Include in GEP-BPIP Analysis?
Product Silos	144	120	120	170	144	360	432	720	Y
Crystallization Area	120	75	280	290	120	300	360	600	Y
Drying Area	120	50	180	187	120	300	360	600	Y
Steam Plant	115	152	165	224	115	288	345	575	Y
Soda Ash Plant	115	375	400	548	115	288	345	575	Y
Product Storage Silos	110	160	160	226	110	275	330	550	Y
Product Loadout Station	106	52	94	107	106	265	318	530	Y
Primary Screening	105	54	96	110	105	263	315	525	Y
Caustic/Sulfite Plant	93	150	355	385	93	233	279	465	Y
South Headframe	168	30	30	42	42	232	127	212	Y
North Headframe	168	30	30	42	42	232	127	212	Y
West Ore Storage	65	120	400	418	65	163	195	325	Y
Ore Storage Building	63	123	700	711	63	158	189	315	Y
Coal Storage	63	123	510	525	63	158	189	315	Y
Plant Condensate Tank	55	80		80	55	138	165	275	Y
Primary Crushing	58	34	34	48	48	130	144	240	Y
Ore Crushing Station	60	22	34	40	40	121	121	202	Y
Transfer Tower No. 1	75	20	20	28	28	117	85	141	Y
Mine Water	45	45		45	45	113	135	225	Y
Transfer Tower No. 3	70	20	20	28	28	112	85	141	Y
Transfer Tower No. 4	70	20	20	28	28	112	85	141	Y
North Hoist House (assumed same as S.HH)	41	56	100	115	41	103	123	205	Y
South Hoist House	41	56	100	115	41	103	123	205	Y
Cooling Tower	40	30	90	95	40	100	120	200	Y
Unloading Station	38	27	63	69	38	95	114	190	Y
Primary Filter Feed	37	70		70	37	93	111	185	Y
Mine Water	37	48		48	37	93	111	185	Y
Primary Filter Feed Tank	37	70		70	37	93	111	185	Y
Tank - 75	37	70		70	37	93	111	185	Y
Transfer Tower No. 2	40	20	20	28	28	82	85	141	Y
Primary Thickener	26	220		220	26	65	78	130	Y

Building Name	Height (feet)	Width (or Diameter) (feet)	Length (feet)	MPW (feet)	L (feet)	GEP Formula (feet)	3L (feet)	5L (feet)	Include in GEP-BPIP Analysis?
Primary Thickener	19	120		120	19	48	57	95	Y
Metering Station		50	100	112	112	168	335	559	N
Coal Storage - Tower	74	31	33	45	45	142	136	226	N
Ore Storage - Tower	74	31	33	45	45	142	136	226	N
Clear Liquor Tank	55	110		110	55	138	165	275	N
Tank-96	40	55		55	40	100	120	200	N
Weak Liquor Tank	37	70		70	37	93	111	185	N
Process Water Tank	37	70		70	37	93	111	185	N
Crystallizer Wash	37	70		70	37	93	111	185	N
Tank-92	37	70		70	37	93	111	185	N
Tank-73	37	70		70	37	93	111	185	N
Thickening & Pumphouse	36	43	72	84	36	90	108	180	N
Change House, Shop, & Warehouse	35	200	325	382	35	88	105	175	N
Weak Liquor	35	70		70	35	88	105	175	N
Admin. Buildings	31	117	202	233	31	78	93	155	N
Maintenance Warehouse	25	75	100	125	25	63	75	125	N
Secondary Thickener	23	160		160	23	58	69	115	N
Tank-11	23	160		160	23	58	69	115	N
Change House	15	55	95	110	15	38	45	75	N
Plant Main Substation	12	22	65	69	12	30	36	60	N

Inputs and outputs from the GEP-BPIP analysis are presented in the enclosed computer disks.

5.4 RECEPTOR SELECTION

The receptor grid is divided into two primary groups: property receptors and a Cartesian grid.

Based on agency guidance, property receptors were placed at a distance of 500 meters from the nearest source. A rectangular array was defined by placing the western edge 500 meters west of the western-most source (the mine exhaust vent), the eastern edge 500 meters east of the eastern-most source (the product loadout), and doing the same for the north and south edges. All receptors were given the same base elevation as the facility sources to represent the flatness of the area around the SSAJV plant.

A 10 kilometer square area surrounding the plant was covered with a 500 meter Cartesian grid. Receptor elevations for the Cartesian grid were determined using digital terrain data obtained from Bowman Engineering. Each receptor is assigned the maximum elevation within a 500 meter square centered on the receptor.

No receptors were placed inside the property receptors.

5.5 AIR QUALITY RELATED VALUES

In addition to the NAAQS, PSD, and HAPs analyses, air emissions from the SSAJV facility were evaluated with respect to impacts on surrounding Class I Area, Air Quality Related Values (AQRVs). These impacts include plume visibility, regional haze, and acid deposition.

5.5.1 Plume Visibility

A plume has the potential to impact scenic vistas at nearby Class I Areas. For a given scenic vista, plume visibility is estimated using the EPA VISCREEN model. The EPA's

VISCREEN model was used for these analyses, following EPA guidance as set forth in the Tutorial Package for the VISCREEN MODEL (EPA, June 1992).

The perceptibility of a plume is defined by two parameters: contrast and color difference, or Delta E. A contrast of 0.02 (where 1.0 would be a black/white contrast) and a Delta-E of 1 are generally assumed to be the threshold of human perceptibility. The screening criteria that VISCREEN uses are a contrast of 0.05 and a Delta-E of 2.0

A Level 1 screening analysis is performed assuming meteorological data of stability F and a wind speed of 1.0 m/s. If compliance cannot be shown with a Level 1 analysis, a Level 2 analysis is performed. In a Level 2 analysis, actual meteorological data is assessed and the "worst" one percent of the data is eliminated, giving more realistic meteorological data. In addition, the Stability is shifted one stability less stable to account for the elevation change between the source and the Class I area.

5.5.2 Regional Haze

Particulate and NO_X emissions can contribute to the formation of regional haze and impair the general visibility in a region.

IWAQM guidance provides for a screening method to estimate regional haze impacts based on 24-hour modeled impacts. Air quality impacts, as modeled by ISC3, are used in the regional haze calculation.

5.5.3 Acid Deposition

NO_X and SO_2 emissions have the potential to convert to nitrates and sulfates and be deposited into sensitive lakes, ponds, and other water bodies. This can increase the acidity of these water bodies. Following the screening procedure described in the Interagency Workgroup on Air Quality Models (IWAQM) acid deposition in several area lakes was assessed. The lakes considered in this analysis, along with their location and baseline acid neutralization capacity (ANC) are given in Table 5-8. These lakes were suggested for analysis by Ann Mebane of the U.S. Forest Service in Pinedale, Wyoming.

Table 5-8: Lakes Considered in Acid Deposition Analysis

Lake	UTM Coordinates (meters)		Elevation		ANC
	Easting	Northing	(feet)	(meters)	
Black Joe Lake	650,500	4,733,100	10,259	3,127	46
Deep Lake	648,600	4,731,400	10,502	3,201	40
Hobbs Lake	608,200	4,765,400	10,060	3,066	57
Ross Lake	609,000	4,805,300	9,675	2,949	51
Saddlebag Lake	644,400	4,720,800	11,262	3,433	28.4
Klondike Lake	611,000	4,787,500	11,215	3,418	20
Upper Titcomb Lake	640,500	4,717,500	10,597	3,230	34